

Machine Learning, A bird's eye view:

M medium.com/@manveetdn/understanding-machine-learning-as-6-jars-eecfafc77051



We are travelling on a **train** called **World** running with **wheels** called **technology** on track called **Machine Learning, Deep Learning, Artificial Intelligence** spending seconds, minutes, hours learning them.



Where Machine Learning can be used

Machine Learning has a vast Applications

Machine learning plays a major key role in many industries in our daily lives where data plays a prior role this is a try making you understand the main parts of machine learning.

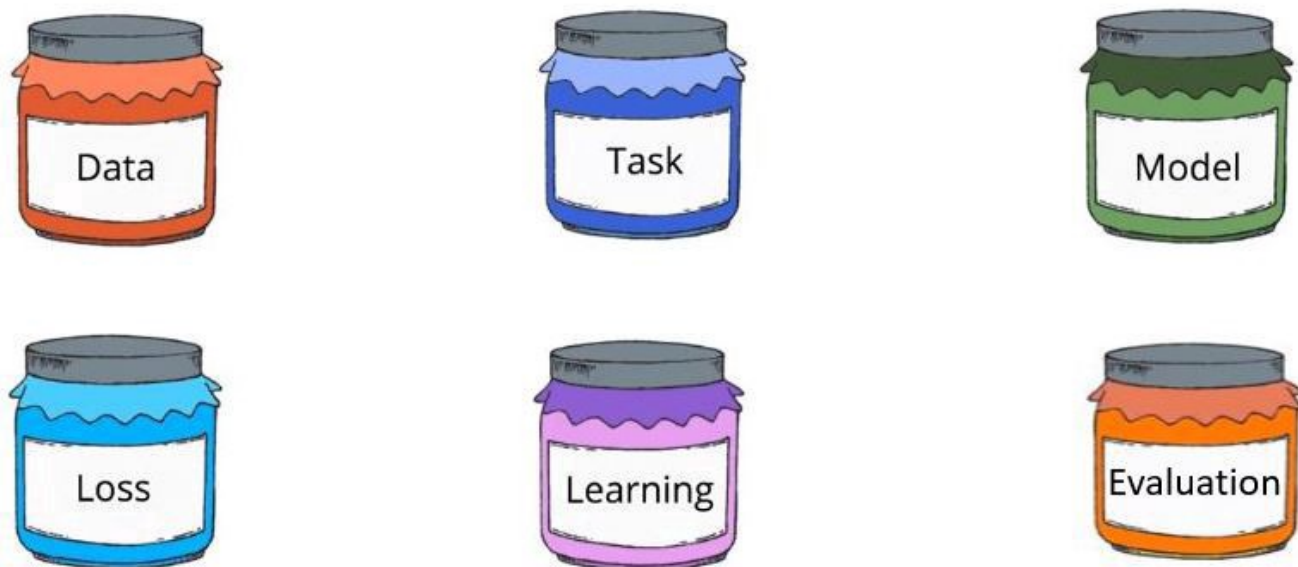
Six Jars of Machine Learning:

Machine learning is all based on making a machine learn from a wide range of data. Machine learning is divided into mainly 6 elements mainly.



When ever I come across the word machine leaning that reminds me of a big jargon of subtle things to deal with comes into my mind **Classification, BackPropogation, GadientDescent,Regression, Convolution Neural Network.....** So on.....

Breaking down the complex jargon into 6 main jars :

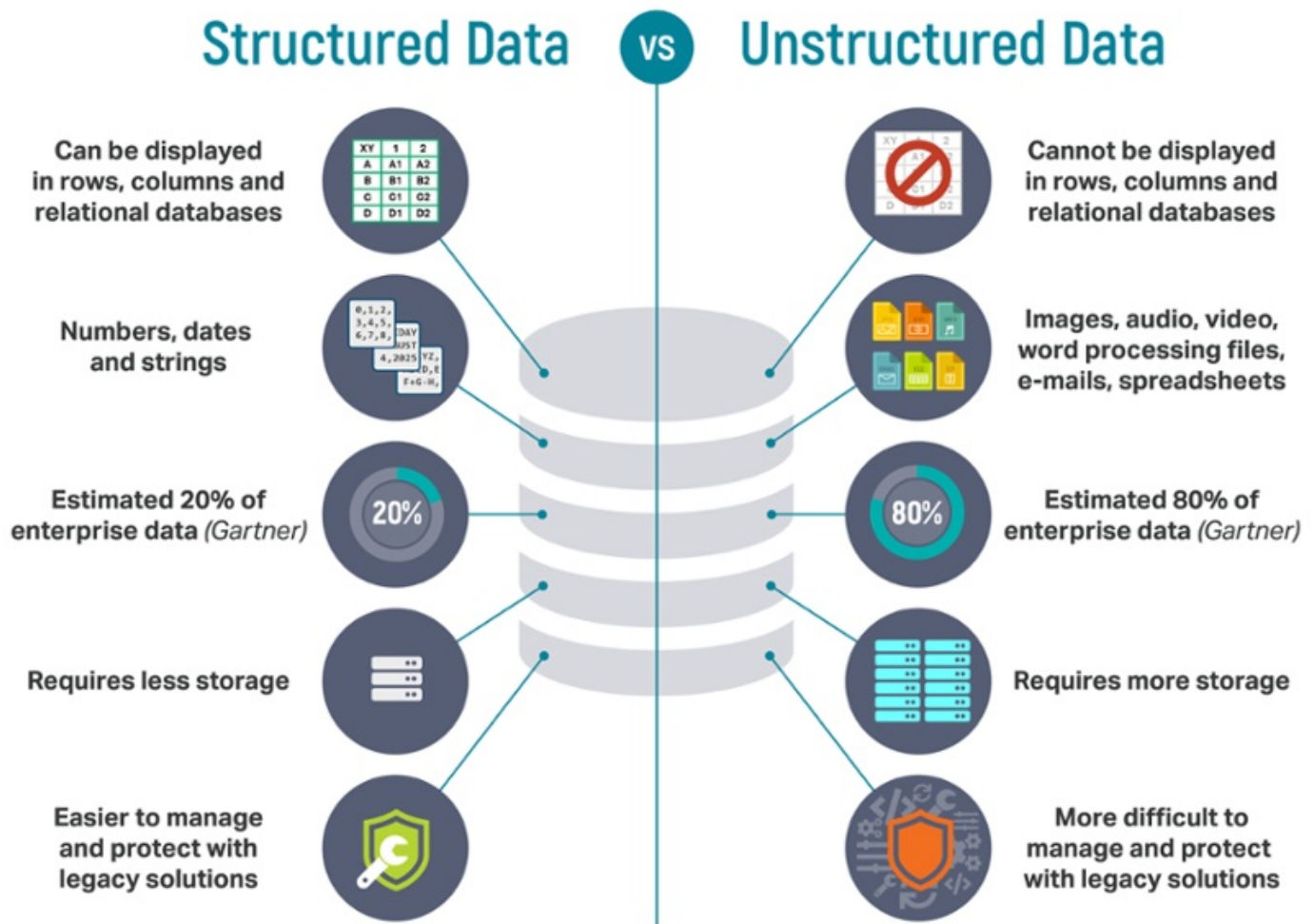


Source : OneFourth Labs

1.DATA:

Data is the core element of machine learning. Every where data is present classified into different forms .

*Data is mainly classified into two types **Structured data and Unstructured data***

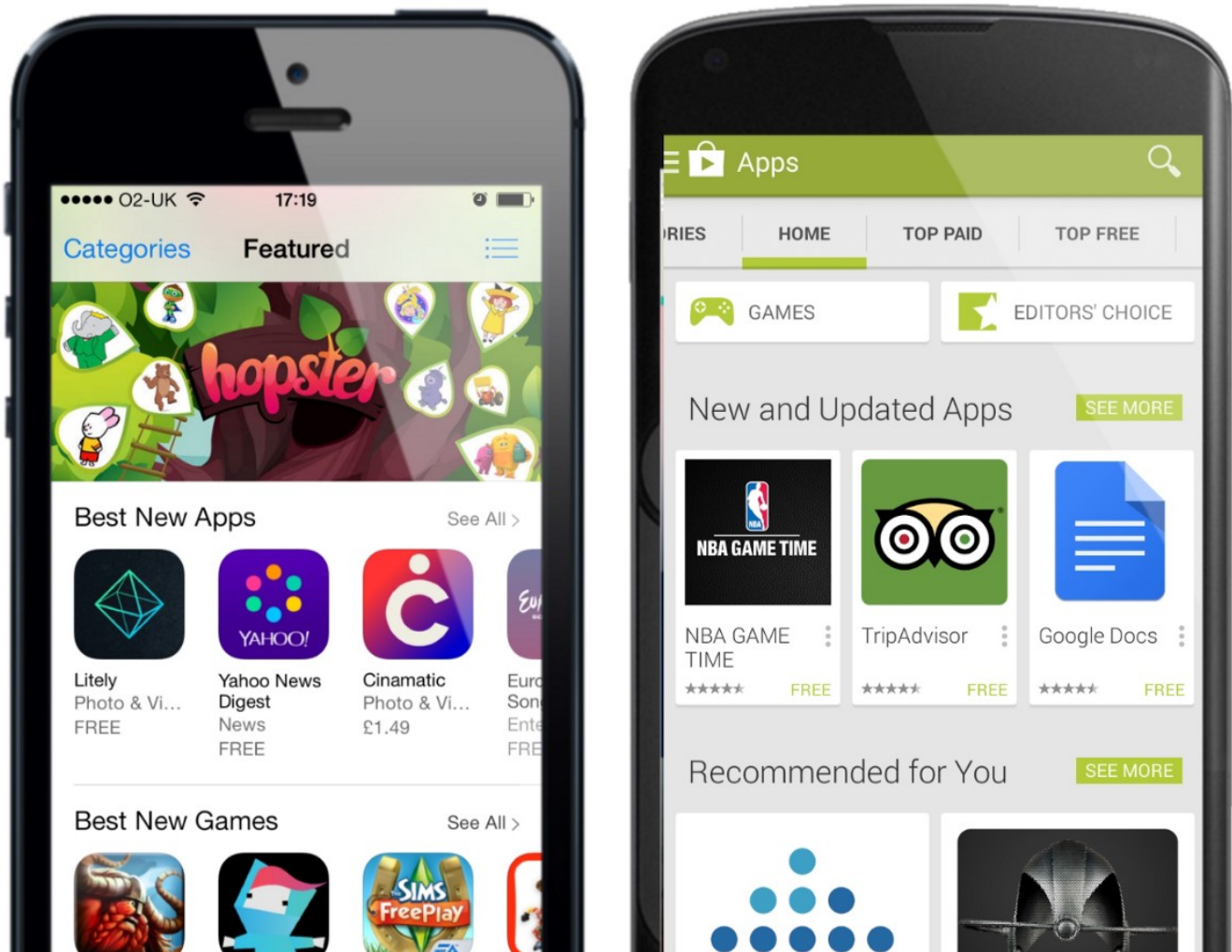


Data... Data... Data... everywhere.

The beside image specifies the difference between Structured and unstructured data.

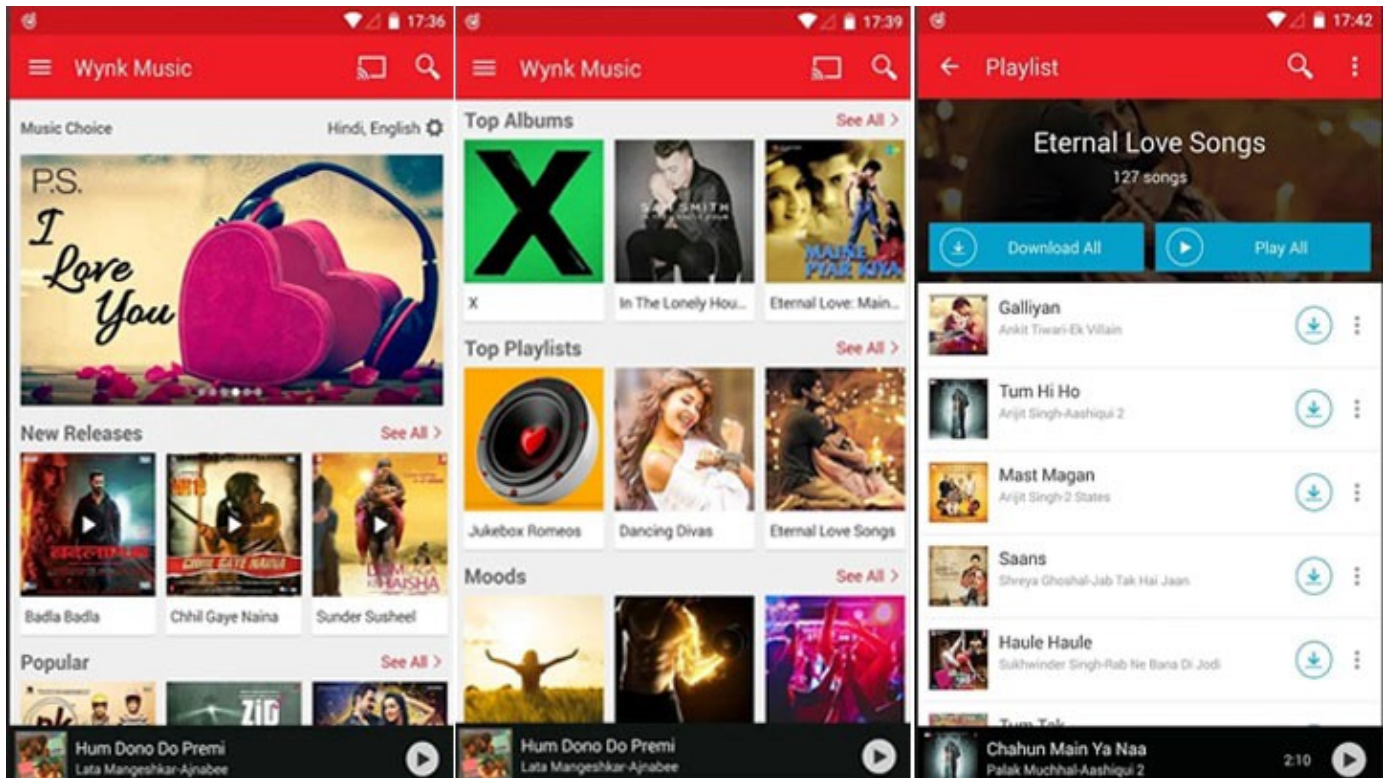
Ex: If we take the amazon web page of a product the description of the item is in form of images,tables,paragraphs which are called as image data,structured data,text data.Like that we can find data every where

The data in from of **tabular format** is called **Structured data** and in form of **images,text,audio** is called **Unstructured data**



also contains different sort of data like **image data** ,**text data**, **review data**.

Facebook contains all sort of data such as **text data**,**image data** ,**video data** and all types of data. Data is every where around you with the things and in the things you use daily when coming back t



Wynk App Home Page

Wynk, Saavn, Ganna and whole lot other contains other types of data like **audio data and text data**.

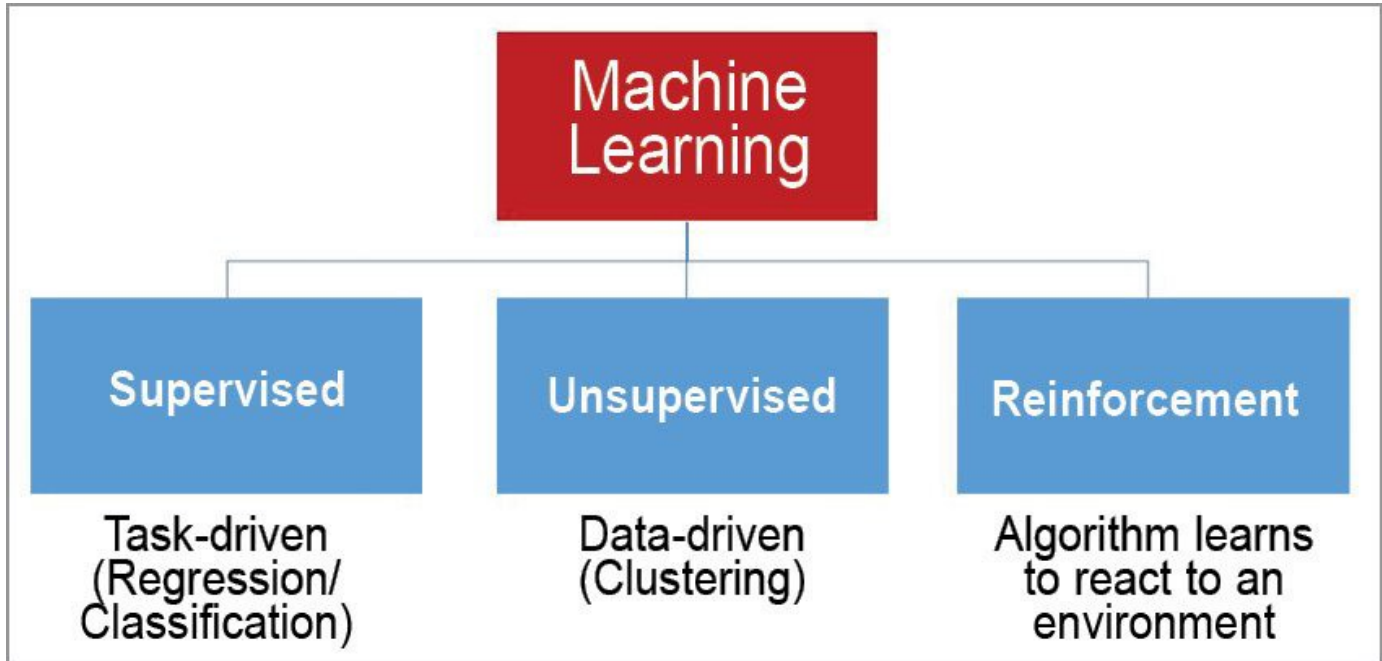
Now a days for machine learning, deep learning and AI agents, data is as important as heart beat :P



2.Tasks:

What to do with data?

Tasks is the next stage after a collection of data finding various datasets. After collection of data **what do we do with that?** We should do That's not like we can apply machine learning for all kind of data. This is the stage of learning from data what to do?.



Second stage after collecting data

UnSupervised learning:(Clustering)

Generating in general that s **Images from Images** or **Text from text** in general is called Unsupervised learning.The most common unsupervised learning method is cluster analysis which is used for exploratory data analysis to find hidden patterns or grouping in data.

Supervised learning:(Regression/Classification)

Supervised learning is a type of machine learning that enables the model to predict future outcomes after they are trained based on past data.

Reinforcement Learning:

This is a kind of learning where the machine in trained to do a particular task,it learns on its own depending on its previous experiences and outputs happened before while doing a particular kind of task.

3.Models:

What is the mathematical formula of a task? for the task we come across all the data and find we will have always two values x and y. We will have a relationship between x and y

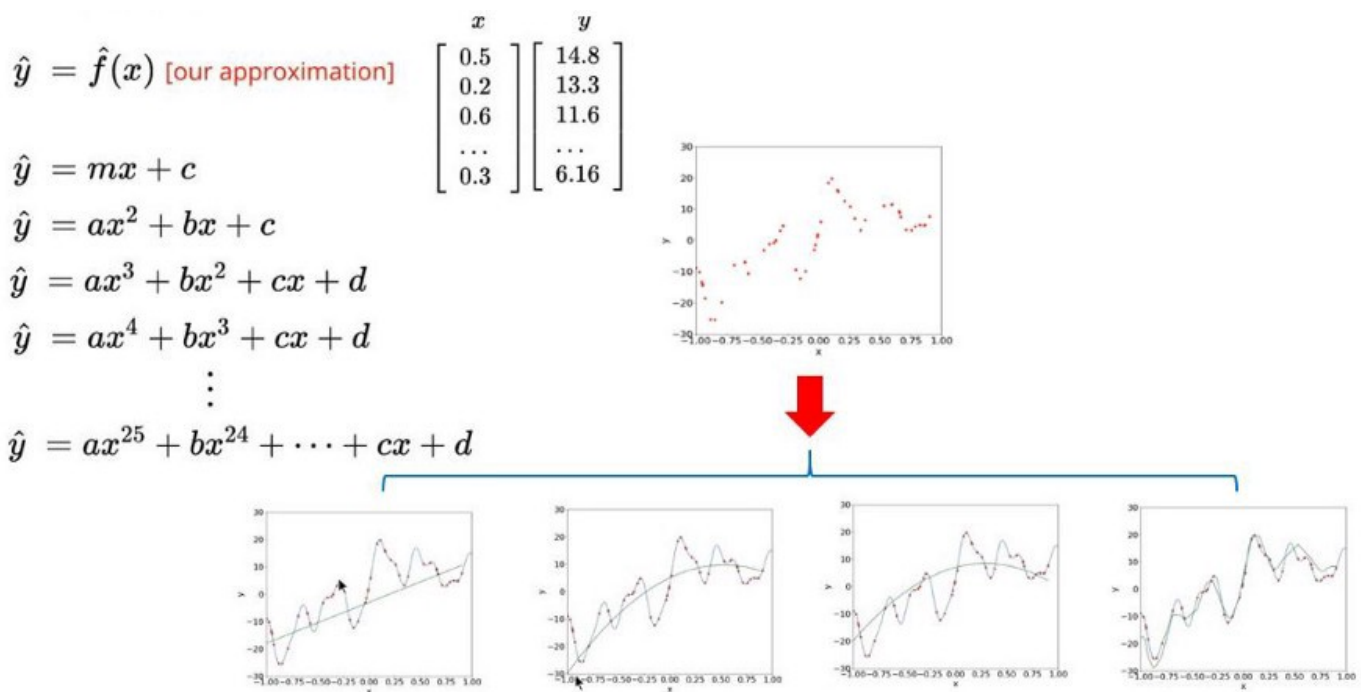
$$y = f(x) \text{ [true relation, unknown]}$$

$$\hat{y} = \hat{f}(\hat{x}) \text{ [our approximation]}$$

Source: OneFourth Labs

We will not know what the true relation is but we will some how come up with a approximate relation in this stage.

We will be start learning parameter starting from linear functions and we will even the changing the degree of the function and try that the until the data set is satisfies all the outputs as per requires



Source: OneFourth Labs

Beside is the final that solution of function of degree 25 satisfying all the inputs and generating satisfactory outputs and finally we end up with a polynomial of degree 25 starting with linear polynomial shuffling random weights. this how will make the machine learn from the data.

$$y = \sigma(wx + b)$$

$$y = \text{Deep_NN}(x)$$


$$y = \text{Deep_CNN}(x) \dots$$


$$y = \text{RNN}(x) \dots$$


Like this the Machine Learning engineer comes up with a solution function we come across different function in this like beside that is the neural network functions.

5. Loss Function:

	x	y	$\hat{f}_1(x)$	$\hat{f}_2(x)$	$\hat{f}_3(x)$
1	0.00	0.24	0.25	0.32	0.08
2	0.10	0.08	0.09	0.30	0.20
3	0.20	0.12	0.11	0.31	0.14
....
n	6.40	0.36	0.36	0.22	0.15

 $\hat{f}_1(x) = 1.79x^{25} - 4.54x^{24} + \dots - 1.48x + 2.48$

 $\hat{f}_2(x) = 2.27x^{25} + 9.89x^{24} + \dots + 2.79x + 3.22$

 $\hat{f}_3(x) = 3.78x^{25} + 1.57x^{24} + \dots + 1.01x + 8.68$

How do we know that which model is better? Every person will come up with his own function satisfying the outputs differently how do we do we know that. Now the importance of the loss function comes into picture for us.

Square Error Loss:

The loss function is defines as the Square of difference of the true output to the output of the model then we will compare all the

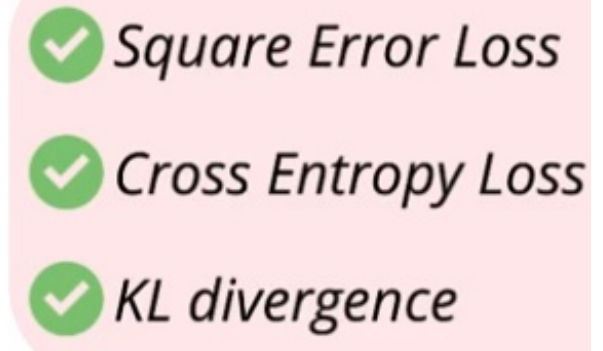
$$\mathcal{L}_1 = \sum_{i=1}^n (y_i - \hat{f}_1(x_i))^2$$

loss functions for all models and then which model has less loss will be declared as the better model

The Square of the Difference is for avoid negative and positive differences of $(y-f(x))$ value square of the values makes negative value positive and adds that up and we will have most accurate loss.

Source:OneFourth Labs

In Calculating Loss also different methods are used as shown beside the above one we discussed in Square Error Loss.

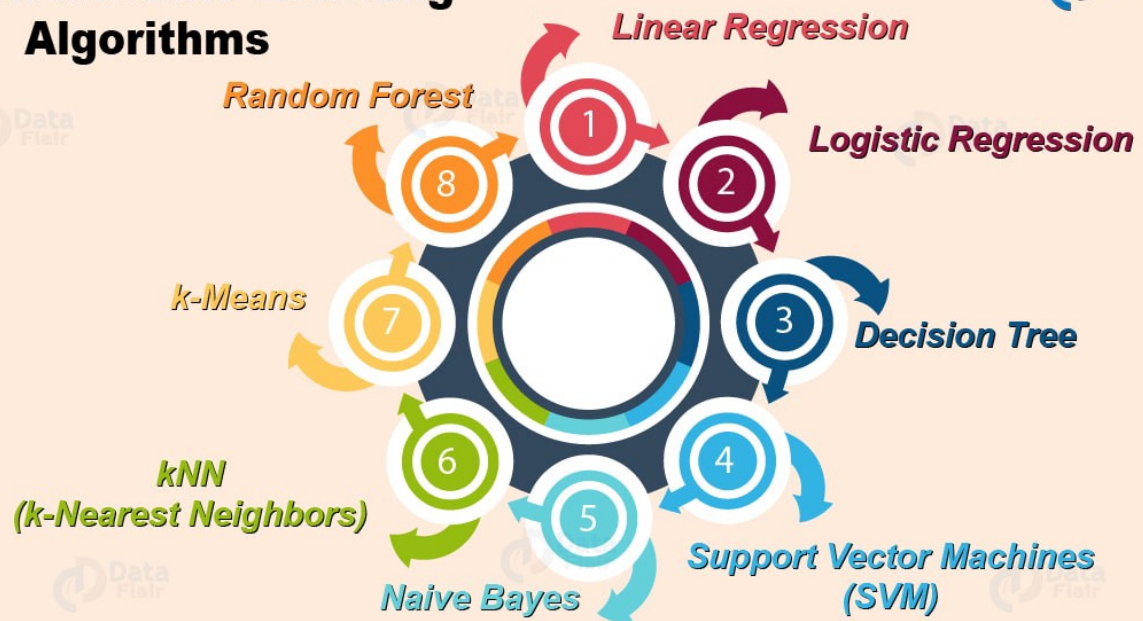


Cross Entropy Loss:

Cross-entropy loss, or log loss, measures the performance of a classification model whose output is a probability value between 0 and 1. Cross-entropy loss increases as the predicted probability diverges from the actual label. So predicting a probability of .012 when the actual observation label is 1 would be bad and result in a high loss value. A perfect model would have a log loss of zero.

5.Learning Algorithms:

8 Python Machine Learning Algorithms



Some Algorithms of Machine Learning

Learning algorithm is a very crucial step to step in and here we come into making the model learn the values very effectively in no time and we also need the loss to be minimised in this case.

How Efficiently the algorithm works and fetches the weights and with a minimised loss value matters.

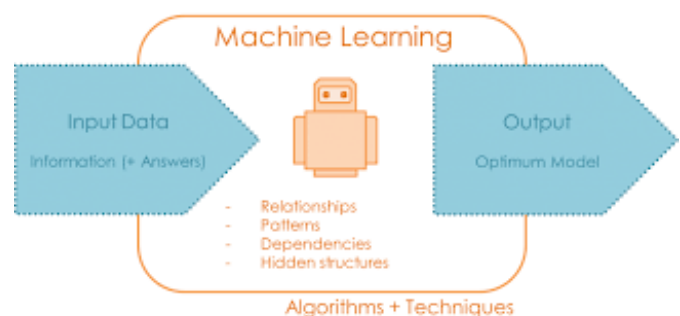
Ex: Let the values of weights a, b, c

Here where the machine steps into that is finding a, b, c values accurately, efficiently and quickly.

6.Evaluation:

Evaluation of model is done based on the some metrics. the best metrics are

Evaluating based on Different outputs



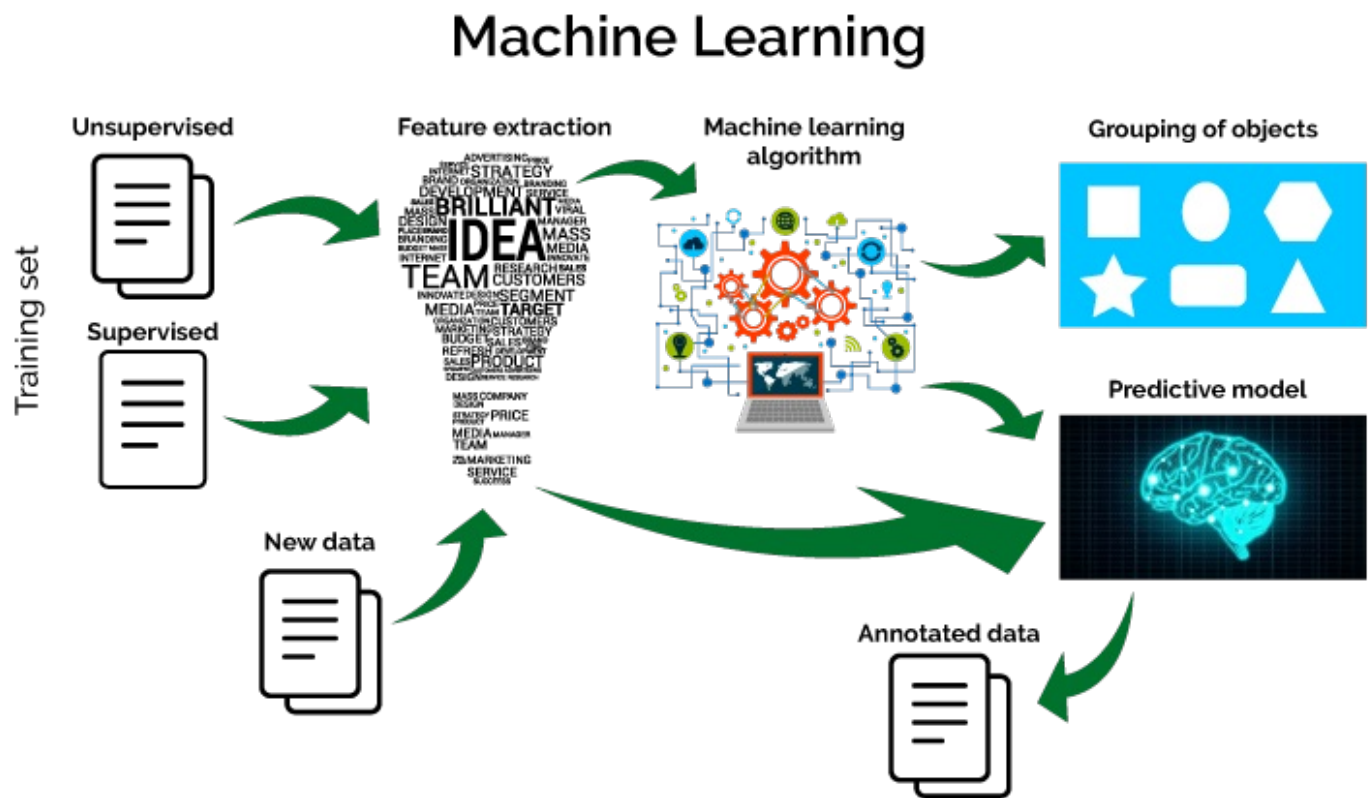
Top3 accuracy:

Compare the first the search results give by the Google. Actually in a generalised manner we firstly see the **top 3** or **top 5** hits out of 10–15 results gives us to be useful and relevant. This metric is used in Image Net Classification.

Different from loss function:

1. One explanation could be to say that the results we given in the percentage %, will make more sense than which is given in the terms of loss function values or so.
2. Percentage gives overall performance of the model over data accurately in a well shown manner.

Finally with all the steps of ML model :



We End up here learning many about machine learning the main pillar which are the basement of a building called machine learning

Thanks Padhai OneFourthLabs I have grasped a lot of content from this course 'A first course on Deep Learning'.